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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/699,450	10/31/2003	Venkata A. Bhagavatula	SP02-275	2835

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EXAMINER	
ROJAS, OMAR R	
ART UNIT	PAPER NUMBER
2874	

DATE MAILED: 11/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary	Application No.	Applicant(s)	
	10/699,450	BHAGAVATULA ET AL.	
	Examiner	Art Unit	
	Omar Rojas	2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *September 16, 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-17,21 and 22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *4 and 15-17* is/are allowed.

6)☒ Claim(s) *1,5,11-14 and 21* is/are rejected.

7)☒ Claim(s) *6-10 and 22* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: *Detailed Action*.

DETAILED ACTION

Response to Amendment

1. With regards to the amendment filed on September 16, 2005, all the requested changes to the claims have been entered. Claims 1, 4-17, and 21-22 are pending.

Response to Arguments

2. Applicant's arguments with respect to claims 1 and 4-17 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

3. Claim 13 is objected to because of the following informalities: Claim 13 recites the limitation "a relative index difference of the graded-index lens." This limitation is considered somewhat unclear because it does not specify which indices of the lens are being related (i.e., the index of the core to the cladding). Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1, 5, 11-14, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,768,837 B1 to Thual et al. ("Thual") in view of the article titled "Ideal Microlenses for Laser to Fiber Coupling" by Edwards et al. ("Edwards") published in the Journal of Lightwave Technology and provided by Applicant(s) in an Information Disclosure Statement.

Regarding claims 1, 5, and 21, Thual discloses a fiber lens (e.g., see Figure 4), comprising:

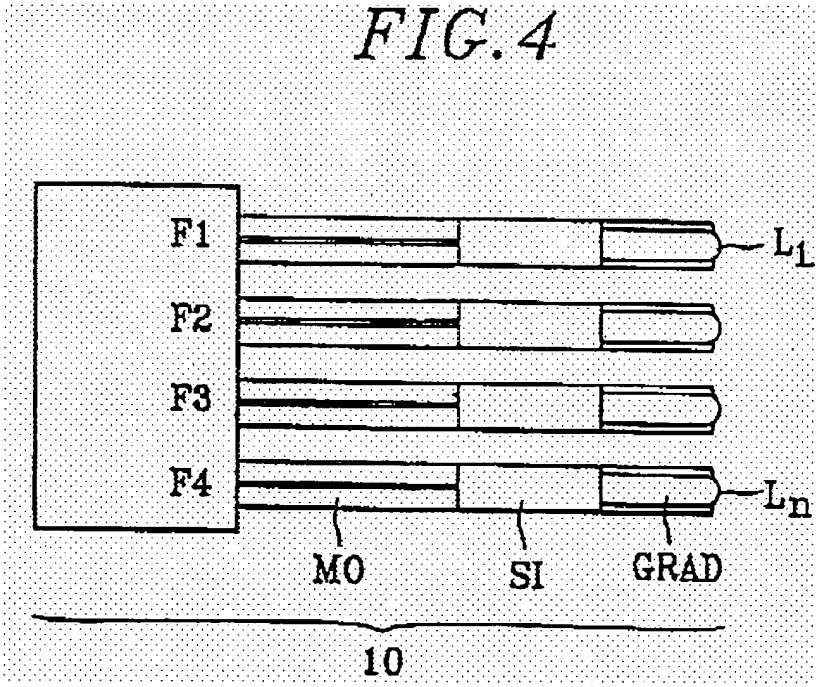
a graded-index lens ("GRAD");

a single-mode fiber ("MO") disposed at a first end of the graded-index lens;

a refractive lens ("L_1") having a hemispherical shape formed at a second end of the graded-index lens ("GRAD") to focus a beam from the single-mode fiber to a diffraction-limited spot; and

a spacer rod ("SI") interposed between the graded-index lens ("GRAD") and the single-mode fiber ("MO").

Figure 4 of Thual is reproduced below.



Regarding claim 14, it is well-known that optical fibers generally operate in within a range of 250 to 2,000 nm. Thus, the limitations of claim 14 are considered inherently present in Thual in view of the previous remarks concerning claim 1.

Thus, Thual only differs from claims 1, 5, and 14, in that Thual does not teach a hyperbolic shape.

The Edwards article, however, teaches that lenses with hyperbolic shape are superior to lenses with hemispherical shape (see Abstract). Thus, modifying the hemispherical lens L_1 in Thual to have a hyperbolic shape would have been desirable in view of Edward's teachings.

Therefore, it would have been obvious to one of ordinary skill at the time of the claimed invention to obtain the invention specified by claims 1, 5, and 14.

Regarding claim 11, it is well-known that conventional graded index fibers have core diameters meeting the recited values. Thus, a core diameter within the range of 50 to 500 μm is considered inherently present in Thual in view of the previous remarks concerning claim 1. Therefore, the invention specified by claim 11 is also considered obvious in view of Thual combined with Edwards. Alternatively, it would have been further obvious under 35 U.S.C. § 103 to adjust the core diameter of the graded index lens to meet the limitations of claim 11 in order to optimize the propagation period as taught by the Semo reference, cited in the previous Office action (see Semo at col. 5, ll. 15-18).

Regarding claim 12, Thual suggests an outer diameter for his graded-index lens within the recited range at col. 4, lines 29-32. Therefore, the invention specified by claim 12 is also considered obvious in view of Thual combined with Edwards.

Regarding claim 13, the claimed limitations are considered inherently present in Thual since they appear to include conventional refractive index values for graded-index lenses. Thus, claim 13 is also considered obvious in view of Thual combined with Edwards. Alternatively, in view of the Semo reference, it would have been further obvious under 35 U.S.C. § 103 to adjust the relative index difference of the graded-index lens of Thual to meet the limitations of claim 21 in order to optimize the GRIN fiber pitch as taught by Semo (see Semo at col. 5, ll. 34-38).

Regarding claim 21, the previous remarks are incorporated herein. Neither Edwards nor Thual appear to mention a lens having a "near-hyperbolic shape" as recited by claim 21. However, providing an imperfect or "near-hyperbolic" shaped lens could easily be fabricated by using less accuracy or control in manufacturing the hyperbolic lens disclosed by Edwards. Providing a lens with a near-hyperbolic shape would have been desirable in order to reduce manufacturing costs. Therefore, the invention specified by claim 21 is also considered obvious in view of Thual combined with Edwards.

Allowable Subject Matter

6. Claims 4 and 15-17 are allowed.

7. Claims 6-10 and 22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 4, Thual specifically teaches forming the lens ("L_1") by melting an end of the graded-index lens ("GRAD") (Thual, col. 4, lines 29-32). Thus, in the Examiner's opinion, it would not have been obvious to modify Thual so that his spacer rod ("SI") is interposed between the refractive lens ("L_1") and graded-index lens ("GRAD"). Therefore claim 4 is deemed allowable.

Regarding claims 6-10, neither Thual nor Edwards disclose or suggest a mode field diameter of less than 10 μm as recited by base claim 6. In the Examiner's opinion it would not have been obvious to achieve this limitation absent applicant's own teachings concerning the design of the fiber lens assembly. Therefore claims 6-10 are deemed allowable.

Regarding claims 15-17, neither Thual nor Edwards disclose or suggest a mode field of a beam waist that is less than 10 μm and a ratio of distance from the tip of the lens to the beam waist to the mode field diameter at the beam waist greater than 5, as recited by independent claim 15. In the Examiner's opinion it would not have been obvious to achieve this limitation absent applicant's own teachings concerning the design of the fiber lens assembly. Therefore claims 15-17 are allowed.

Regarding claim 22, neither Thual nor Edwards disclose or suggest using a correction factor that compensates for beam curvature as recited by claim 22. In the Examiner's opinion it would not have been obvious to achieve this limitation absent applicant's own teachings concerning the design of the fiber lens assembly. Therefore, claim 22 is deemed allowable.

Conclusion

9. Since the Edwards reference used in the above rejection was submitted by Applicant(s) in a prior art statement, no copies thereof are provided with this Office action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Omar Rojas whose telephone number is (571) 272-2357. The examiner can normally be reached on Monday-Friday (12:00PM-8:00PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rod Bovernick, can be reached on (571) 272-2344. The official facsimile number for regular and After Final communications is (571) 273-8300. The examiner's RightFAX number is (571) 273-2357.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Omar Rojas
Patent Examiner
Art Unit 2874

AKM ENAYET ULLAH
PRIMARY EXAMINER

or
November 23, 2005